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NASA/SP—1998-7011/SUPPL474
September 21, 1998

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

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54 Man/System Technology and Life Support 6

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Typical Report Citation and Abstract

1. 19970001126 NASA Langley Research Center, Hampton, VA USA
2. Water Tunnel Flow Visualization Study Through Poststall of 12 Novel Planform Shapes
3. Gatlin, Gregory M., NASA Langley Research Center, USA Neuhart, Dan H., Lockheed Engineering and Sciences Co., USA
4. Mar. 1996; 130p. In English
5. Contract(s)/Grant(s): RTOP 505-68-70-04
6. Report No(s): NASA-TM-4663; NAS 1.15:4663; L-17418; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

7. To determine the flow field characteristics of 12 planform geometries, a flow visualization investigation was conducted in the Langley 16- by 24-Inch Water Tunnel. Concepts studied included flat plate representations of diamond wings, twin bodies, double wings, cutout wing configurations, and serrated forebodies. The off-surface flow patterns were identified by injecting colored dyes from the model surface into the free-stream flow. These dyes generally were injected so that the localized vortical flow patterns were visualized. Photographs were obtained for angles of attack ranging from 10° to 80°, and all investigations were conducted at a test section speed of 0.25 ft per sec. Results from the investigation indicate that the formation of strong vortices on highly swept forebodies can improve poststall lift characteristics, however, the asymmetric bursting of these vortices could produce substantial control problems. A wing cutout was found to significantly alter the position of the forebody vortex on the wing by shifting the vortex inboard. Serrated forebodies were found to effectively generate multiple vortices over the configuration. Vortices from 65° swept forebody serrations tended to roll together, while vortices from 40° swept serrations were more effective in generating additional lift caused by their more independent nature.

8. Author
9. *Water Tunnel Tests; Flow Visualization; Flow Distribution; Free Flow; Planforms; Wing Profiles; Aerodynamic Configurations*

Key

1. Document ID Number, Corporate Source
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AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 474)

SEPTEMBER 21, 1998

51
LIFE SCIENCES (GENERAL)

19980206467 NASA Marshall Space Flight Center, Huntsville, AL USA
Animal Enclosure Module (AEM)
Life and Microgravity Spacelab (LMS); Feb. 1998; pp. 337-360; In English; Also announced as 19980206462; No Copyright; Avail: CASI; A03, Hardcopy; A06, Microfiche

The primary objective of this research project is to test the hypothesis that corticosteroids contribute to the adverse skeletal effects of space flight. To achieve this objective, serum corticosteroids, which are known to increase during space flight, must be maintained at normal physiologic levels in flight rats by a combination of adrenalectomy and corticosteroid supplementation via implanted hormone pellets. Bone analyses in these animals will then be compared to those of intact flight rats that, based on past experience, will undergo corticosteroid excess and bone loss during space flight. The results will reveal whether maintaining serum corticosteroids at physiologic levels in flight rats affects the skeletal abnormalities that normally develop during space flight. A positive response to this question would indicate that the bone loss and decreased bone formation associated with space flight are mediated, at least in part, by corticosteroid excess.
Author
Bone Demineralization; Musculoskeletal System; Corticosteroids; Microgravity; Gravitational Effects; Spaceborne Experiments; Physiological Responses

19980206470 NASA Marshall Space Flight Center, Huntsville, AL USA
Space Tissue Loss Configuration B (STL-B)
Life and Microgravity Spacelab (LMS); Feb. 1998; pp. 607-619; In English; Also announced as 19980206462; No Copyright; Avail: CASI; A03, Hardcopy; A06, Microfiche

The goal of these experiments was to determine the effect of microgravity on the early development of the fish medaka. There were two objectives for this flight series. The primary objective was to assess the effects of microgravity on different stages of development and to ascertain whether the relevant developmental questions can be addressed at the gross morphological level or if the issues involve more subtle questions about regulation at the molecular and cellular levels. The secondary objective was the assessment of the utility of flight hardware with the capabilities to perform embryological studies. We have been able to take advantage of the flight testing phase of the STL-B hardware to also study the effects of microgravity on the early development of the fish, Medaka. Our initial studies involved monitoring the early Medaka development and raising flight embryos for breeding. Images of the developing embryos were collected either via video which was either taken by the astronauts or broadcast to Earth. Sample video images were digitized and stored on a hard drive resident within the on-board STL-B unit. Embryos were fixed at specific intervals, returned to Earth and are being analyzed for the timing and location of molecular events associated with controlling the morphological pattern for the onset of adult structures.
Author
Microgravity; Gravitational Effects; Spaceborne Experiments; Fishes; Hardware; Space Flight; Embryos

19980206724 Harvard Univ., Cambridge, MA USA
Unraveling photosystems *Final Report*
[1997]; 3p; In English
Contract(s)/Grant(s): DE-FG02-87ER-13743
Report No.(s): DOE/ER/13743-T1; DE97-009422; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)); Hardcopy; Microfiche

This report highlights four main points. (1) A residue substitution in phosphoribulokinase of Synechocystis PCC 6803 renders the mutant light-sensitive. The authors isolated a light-sensitive mutant (BRLS) of the photosynthetic cyanobacterium Synechocystis 6803 that does not survive exposure to bright light. 70% of BRLS cells die upon exposure to light of greater than 3000 lux for 2 hr. (2) Excitation energy transfer from phycocyanin to chlorophyll in an apcA-defective mutant of Synechocystis sp. PCC 6803. A greenish mutant of the normally bule-green cyanobacterium Synechocystis sp. PC 6803, designated UVtp, was isolated and characterized. UVtp possesses functional photosystems I and II but lacks normal light harvesting phycobilisomes because allophycocyanin is absent and core-specific linker proteins are almost entirely absent. (3) Deletion of the psbG1 gene of the cyanobacterium Synechocystis sp. PCC 6803 leads to the activation of the cryptic psbG2 gene. The genes psbG1 and psbG2 in cyanobacterium Synechocystis sp. PCC 6803 are homologous. The psbG1 gene is located on the chromosome and is part of the ndhC-psbG1-ORF157 operon, while psbG2 is located on a plasmid and is not flanked by equivalent ndhC or ORF157 genes. (4) Deletion of the structural gene for the NADH-dehydrogenase subunit 4 of Synechocystis 6803 alters respiratory properties. Chloroplasts and cyanobacteria contain genes encoding polypeptides homologous to some subunits of the mitochondrial respiratory NADH-ubiquinol oxidoreductase complex (NADH dehydrogenase). Nothing is known of the role of the NADH dehydrogenase complex in photosynthesis, respiration, or other functions in chloroplasts, and little is known about their specific roles in the perhaps 42 subunits of this complex in the mitochondrion.

DOE

Photosynthesis; Energy Transfer; Chromosomes; Chloroplasts; Mitochondria

19980209932 California Univ., San Diego, Dept. of Chemistry, La Jolla, CA USA

From the Primitive Soup to Cyanobacteria: It May have Taken Less Than 10 Million Years

Miller, Stanley L., California Univ., San Diego, USA; Lazcano, Antonio, Universidad Nacional Autonoma de Mexico, Mexico; Circumstellar Habitable *Zones*, 1998, pp. 393-404. In English

Contracts/Grants: NAGw-2881

Report No.(s): NASA/CR-1998-207632; NAS 1.26:207632; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Most scientific discussions on the likelihood of extraterrestrial life have been constrained by the characteristics of life on our planet and the environmental conditions under which it may have emerged. Although it has been generally assumed that this process must have been extremely slow, involving hundreds of millions or even billions of years, a number of recent discoveries have led to a considerable compression of the time believed necessary for life to appear. It is now recognized that during its early history the Earth and other bodies of the inner Solar System went through a stage of intense collisions. Some of these impacts by large asteroids or comets may have raised the terrestrial surface to sterilizing temperatures and may have evaporated the oceans and killed off life as late as 3.8 x 10(exp 9) years ago. However, there is also ample paleontological evidence derived from the 3.5 x 10(exp 9) year old Warrawoona sediments showing that only 800 million years after the period of intense impacts ended, our planet was populated by phototactic, stromatolite-forming microorganisms. Although these discoveries are now generally interpreted to imply that the origin and early evolution of life were rapid, no attempts have been made to estimate the actual time required for these processes to occur.

Derived from text

Biological Evolution; Comets; Collisions; Bacteria

19980210107 Oak Ridge National Lab., TN USA

An editing environment for DNA sequence analysis and annotation

Uberbacher, E. C., Oak Ridge National Lab., USA; Xu, Y., Oak Ridge National Lab., USA; Shah, M. B., Oak Ridge National Lab., USA; Olman, V., Oak Ridge National Lab., USA; Parang, M., Oak Ridge National Lab., USA; Mural, R., Oak Ridge National Lab., USA; [1998]; 9p. In English. 3rd; Biocomputing, 5 Jan. 1998, Kapalua, HI, USA

Contracts/Grants: DE-AC05-96OR-22464

Report No.(s): ORNL/CP-94756; CONF-9801118; DE98-000574; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)); Microfiche

This paper presents a computer system for analyzing and annotating large-scale genomic sequences. The core of the system is a multiple-gene structure identification program, which predicts the most probable gene structures based on the given evidence, including pattern recognition, EST and protein homology information. A graphics-based user interface provides an environment which allows the user to interactively control the evidence to be used in the gene identification process. to overcome the computational bottleneck in the database similarity search used in the gene identification process, the authors have developed an effective way to partition a database into a set of sub-databases of related sequences, and reduced the search problem on a large database

to a signature identification problem and a search problem on a much smaller sub-database. This reduces the number of sequences to be searched from N to O(radical)N) on average, and hence greatly reduces the search time, where N is the number of sequences in the original database. The system provides the user with the ability to facilitate and modify the analysis and modeling in real time.

DOE

Pattern Recognition; Deoxyribonucleic Acid; Proteins; Sequencing

19990210408 Oak Ridge National Lab., TN USA

Overview of PNB track on gene structure identification in large-scale genomic sequence

Uberbacher, E. C., Oak Ridge National Lab., USA; Xu, Y., Oak Ridge National Lab., USA; [1998]; 4p; In English; 3rd; Biocomputing, 4 Jan. 1998, Kapalua, HI, USA

Contract(s)/Grant(s): DE-AC05-96OR-22464

Report No.(s): ORNL/CP-94807; CONF-980118; DE98-000576; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)); Microfiche

The recent funding of more than a dozen major genome centers to begin community-wide high-throughput sequencing of the human genome has created a significant new challenge for the computational analysis of DNA sequence and the prediction of gene structure and function. It has been estimated that on average from 1996 to 2003, approximately 2 million bases of newly finished DNA sequence will be produced every day and be made available on the Internet and in central databases. The finished (fully assembled) sequence generated each day will represent approximately 75 new genes (and their respective proteins), and many times this number will be represented in partially completed sequences. The information contained in these is of immeasurable value to medical research, biotechnology, the pharmaceutical industry and researchers in a host of fields ranging from microorganism metabolism, to structural biology, to bioremediation. Sequencing of microorganisms and other model organisms is also ramping up at a very rapid rate. The genomes for yeast and several microorganisms such as H. influenza have recently been fully sequenced, although the significance of many genes remains to be determined.

DOE

Biotechnology; Deoxyribonucleic Acid; Genes; Influenza; Microorganisms; Pharmacology; Proteins

19980210414 Los Alamos National Lab., NM USA

Applications of optical trapping to single molecule DNA

Soucek, G. J., California Univ., USA; Berns, M. W., California Univ., USA; Keller, R. A., Los Alamos National Lab., USA; [1997]; 6p; In English

Contract(s)/Grant(s): W-7405-ENG-36

Report No.(s): LA-UR-97-3253; DE98-001512; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)); Hardcopy; Microfiche

This is the final report of a three-year, Laboratory Directed Research and Development (LDRD) project at the Los Alamos National Laboratory (LANL). The project focused on the methodologies required to integrate optical trapping with single molecule detection (SMD) so as to demonstrate high speed sequencing through optical micromanipulation of host substrates, nucleotide cleavage, and single molecule detection. As part of this effort, the new technology of optical tweezers was applied to the confinement and manipulation of microsphere handles containing attached DNA fragments. The authors demonstrated substrate optical trapping in rapid flow streams, the fluorescence excitation and detection of fluorescently labeled nucleotides in an optical trapping system, and the epifluorescent imaging of DNA fragments in flow streams. They successfully demonstrated optical trapping in laminar flow streams and completely characterized the trapping process as functions of fluid flow velocity, chamber dimension, trapping depth, incident laser power, and fluorescence measurement geometry.

DOE

Molecular Biology; Deoxyribonucleic Acid; Microparticles; Nucleotides; Fluid Flow; Molecules; Laser Induced Fluorescence

19980210478 Medical Coll. of Wisconsin, Dept. of Cellular Biology and Anatomy, Milwaukee, WI USA

Development of a Deltoid Shoulder Muscle Model for Rhesus Monkey Spaceflight Studies *Final Report*

Riley, Danny A., Medical Coll. of Wisconsin, USA; Macias, Melissa Y., Medical Coll. of Wisconsin, USA; Anders, Scott, Medical Coll. of Wisconsin, USA; Slocum, Glenn R., Medical Coll. of Wisconsin, USA; 1995; 9p; In English

Contract(s)/Grant(s): NAG2-633; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The acromiodeltoid shoulder muscle was demonstrated to be a suitable model for spaceflight studies. The muscle contains a mixture of fast and slow fibers, permitting analysis of muscle fiber type specific changes. Two biopsy sites per muscle were identified that provided samples not degraded by the biopsy procedure. Both sites contained sufficient numbers fibers for deter-

mining changes in fiber type percentages and size. There was adequate bilateral symmetry regarding fiber type composition in the left and right muscles such that a total of four times points can be compared. The ESOP cage did not cause atrophy of deltoid muscle fibers; this means that microgravity-induced atrophy should be detectable. As expected, muscle excision stimulated muscle IgM and IgG muscle autoantibody production. Nonrestrained control animals suppressed this response whereas restrained monkeys showed an abnormally pronounced response indicative a compromised immune system. The presence of ESOP cage-induced changes in the immune response may mask spaceflight-induced effects. The ESOP cage modified the dominant hand operation of the PTS. These results demonstrate the importance of high fidelity ground based controls.
Author
Physiological Responses; Monkeys; Shoulders; Space Flight; Microgravity

19980210870 Argonne National Lab., IL, USA
Third order nonlinear optical properties of stacked bacteriochlorophylls in bacterial photosynthetic light-harvesting proteins
Chen, L. X., Argonne National Lab., USA; Laible, P. D., Argonne National Lab., USA; Spano, F. C., Temple Univ., USA; Manas, E. S., Temple Univ., USA; [1997]. 7p. In English. 27 Jul. - 1 Aug. 1997, San Diego, CA, USA
Contract(s)/Grant(s): W-31109-ENG-38
Report No.(s): ANL/CHM/CP-94165; CONF-970708; DE97-054004; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)); Microfiche

Enhancement of the nonresonant second order molecular hyperpolarizabilities gamma were observed in stacked macrocyclic molecular systems, previously in a (micro)-oxo silicon phthalocyanine (SiPcO) monomer, dimer and trimer series, and now in bacteriochlorophyll a (BChla) arrays of light harvesting (LH) proteins. Compared to monomeric BChla in a tetrahydrofuran (THF) solution, the <gamma for each macrocycle was enhanced in naturally occurring stacked macrocyclic molecular systems in the bacterial photosynthetic LH proteins where BChla's are arranged in tilted face-to-face arrays. In addition, the gamma enhancement is more significant in B875 of LH1 than in B850 in LH2. Theoretical modeling of the nonresonant gamma enhancement using simplified molecular orbitals for model SiPcO indicated that the energy level of the two photon state is crucial to the gamma enhancement when a two photon process is involved, whereas the charge transfer between the monomers is largely responsible when one photon near resonant process is involved. The calculated results can be extended to gamma enhancement in B875 and B850 arrays, suggesting that BChla in B875 are more strongly coupled than in B850. In addition, a 50--160 fold increase in <gamma for the S(sub 1) excited state of relative to S(sub 0) of bacteriochlorophyll in vivo was observed which provides an alternative method for probing excited state dynamics and a potential application for molecular switching.
DOE
Bacteria; Optical Properties; Photosynthesis; Proteins; Chlorophylls

19980210868 Argonne National Lab., IL, USA
Changes in gene expression following EMF exposure
Woloschak, G. E., Argonne National Lab., USA; Paunesku, T., Argonne National Lab., USA; Chang-Liu, C. M., Argonne National Lab., USA; Lobery, L., IIT Research Inst., USA; Gauger, J., IIT Research Inst., USA; McCormick, D., IIT Research Inst., USA; [1997]. 5p. In English. 2nd; Electricity and Magnetism in Biology and Medicine, 8-13 Jun. 1997, Bologna, Italy
Contract(s)/Grant(s): W-31109-ENG-38
Report No.(s): ANL/CMB/CP-94239; CONF-970620; DE97-054504; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)); Microfiche

Experiments were designed to examine the effects of electromagnetic field (EMF) exposure on specific gene expression, an effect that can be deleterious, beneficial, or neutral, depending on the long-term consequences; however, the proof of a reproducible, quantitative biological effect (such as change in gene expression) will lead to latter experiments aimed at determining the relative contribution of these changes to cellular consequences. Past work by ourselves and by others has shown that measures of gene expression are extremely sensitive indicators of the cellular and biological effects of ionizing radiation, with transcriptional changes being detected by exposure of cells to doses of gamma-rays as low as 0.01 cGy that have no pronounced cellular consequences. On the basis of this work, the authors hypothesized that measures of gene expression will be equally sensitive to EMF effects on cells.
DOE
Gene Expression; Biological Effects; Electromagnetic Fields; Ionizing Radiations; Radiation Effects

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

19980206468 NASA Marshall Space Flight Center, Huntsville, AL USA
Life' Human Life Sciences Project
Life and Microgravity Spacelab (LMS); Feb. 1998; pp. 461-588; In English; Also announced as 19980206462; No Copyright; Avail: CASI; A11, Hardcopy; A06, Microfiche

This section of the Life and Microgravity Spacelab (LMS) publication includes articles entitled: (1) E029 - Magnetic Resonance Imaging after Exposure to Microgravity; (2) E030 - Extended Studies of Pulmonary Function in Weightlessness; (3) E074 - Direct Measurement of the Initial Bone Response to Spaceflight in Humans; (4) E401 - The Effects of Microgravity on Skeletal Muscle Contractile Properties; (5) E407 - Effects of Microgravity on the Biochemical and Bioenergetic Characteristics of Human Skeletal Muscle; (6) E410 - Torso Rotation Experiment; (7) E920 - Effect of Weightlessness on Human Single Muscle Fiber Function; (8) E948 - Human Sleep, Circadian Rhythms and Performance in Space; (9) E963 - Microgravity Effects on Standardized Cognitive Performance Measures; and (10) E971 - Measurement of Energy Expenditures During Spaceflight Using the Doubly Labeled Water Method
CASI
Weightlessness; Microgravity; Gravitational Effects; Aerospace Environments; Physiological Responses; Human Performance; Space-Borne Experiments; Spacecraft Environments

19980209692 Lawrence Livermore National Lab., Livermore, CA USA
Modeling of bubble dynamics in relation to medical applications
Amendt, P. A., Lawrence Livermore National Lab., USA; London, R. A., Lawrence Livermore National Lab., USA; Strauss, M., California Univ., USA; Mar. 12, 1997; 16p; In English; 8 - 14 Feb. 1997, San Jose, CA, USA; Sponsored by International Society for Optical Engineering, USA
Contract(s)/Grant(s): W-7405-ENG-48
Report No.(s): UCRL-JC-126961; CONF-970231-47; DE97-053416; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Hardcopy, Microfiche

In various pulsed-laser medical applications, strong stress transients can be generated in advance of vapor bubble formation. to better understand the evolution of stress transients and subsequent formation of vapor bubbles, two-dimensional simulations are presented in channel or cylindrical geometry with the LATIS (LAser TISsue) computer code. Differences with one-dimensional modeling are explored, and simulated experimental conditions for vapor bubble generation are presented and compared with data.
DOE
Two Dimensional Models; Laser Applications; Pulsed Lasers; Bubbles

19980209737 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
The Test-Retest Reliability of the USA Air Forces Submaximal Bicycle Ergometry Aerobic Fitness Test
Gleim, Frank A., Air Force Inst. of Tech., USA; May 19, 1998; 75p; In English
Report No.(s): AD-A344913; AFIT-98-016; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The ability to perform endurance work is dependent on aerobic metabolism. Maximal oxygen consumption (VO2 max) defines aerobic capacity and quantifies an individual's capability for aerobic resynthesis of adenosine triphosphate. VO2 max is the primary indicator of aerobic fitness, cardiovascular health, and endurance performance. When assessing aerobic capacity, a type of exercise must be chosen which involves a large group of muscles and be of sufficient intensity and duration to cause an adjustment in the cardio-respiratory system to the level of exercise. The typical exercise modes include treadmill running and walking, endurance runs and walks for time or distance, stationary cycling, arm cranking, bench stepping, and swimming. to determine aerobic capacity, a maximal test (direct measurement) or a submaximal test (estimation or prediction) is used to obtain a VO2 max value.
DTIC
Physical Fitness; Cycles; Reliability; Armed Forces; Aerobes; Cardiovascular System; Physical Exercise

19980209818 Department of the Navy, Washington, DC USA
Automatic Medical Sign Monitor
Pugh, Jamie K., Inventor, Department of the Navy, USA; Sep. 30, 1997; 9p; In English

Patent Info.: Filed 3 Nov. 1995; US-Patent-Appl-SN-552818; US-Patent-5,671,734
Report No.(s): AD-D018818; No Copyright; Avail: US Patent and Trademark Office, Microfiche

An automatic medical monitor of the present invention comprises medical sign sensors for collecting a time-ordered set of values representative of medical signs such as pulse respiration, and blood pressure. The medical sign sensors are coupled to a medical sign data processor that forms statistics from the medical sign data and forms a modified Fast initial Response (FIR) Shewhart cumulative sum and a variance cumulative sum to detect changes in health state. When a change in health state is detected the medical sign data processor displays the statistics on a display and logs them on a printer.
DTIC
Medical Equipment; Data Processing Equipment; Blood Pressure; Medical Services

54
MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering, biotechnology, and space suits and protective clothing. For related information see also 16 Space Transportation.

19980209724 Defence and Civil Inst. of Environmental Medicine, Downsview, Ontario Canada
A look at Behaviourism and Perceptual Control Theory in Interface Design
Chery, Sandra, Defence and Civil Inst. of Environmental Medicine, Canada; Farrell, Philip S. E., Defence and Civil Inst. of Environmental Medicine, Canada; Feb. 1998; 25p; In English
Report No.(s): AD-A345852; DCIEM-98-R-12; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Behaviourism and Perceptual Control Theory (PCT) were reviewed and their shortfalls, as well as their application to human machine interactions, were assessed. Behaviourism, which studies only observable behaviors and discards the purpose of actions, implies that given a stimulus, one can predict the response. The PCT framework introduces the requirement for a desired perceptual state which would then be compared to its perception. Behaviors would then result in an attempt to minimize the perceptual error when present. However, PCT's shortfall includes the inability to objectively measure internal variables. Behaviourism, on the other hand, can not account for variability in responses, instinctive drift, autoshaping, etc. Researchers have used behaviourism as a framework for human machine interactions concluding that compatibility between a stimulus and its response resulted in increased performance of the system. Other researchers have argued that the use of PCT in human machine interactions can explicitly show all the required feedback messages necessary for a stable and effective interaction between the human and the machine.
DTIC
Human Factors Engineering; Man Machine Systems; Performance Prediction; Perceptual Errors

19980209727 Defence and Civil Inst. of Environmental Medicine, Downsview, Ontario Canada
Water Entry Onto the MAC 200 Immersion Suit During Simulated Parachute Jump and Drag Trials
Ducharme, Michel B., Defence and Civil Inst. of Environmental Medicine, Canada; Thompson, John A., Defence and Civil Inst. of Environmental Medicine, Canada; Jan. 1998; 15p; In English
Report No.(s): AD-A345838; DCIEM-98-R-33; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The MAC 200 immersion suit newly developed by Mustang Survival (Richmond, B.C.) has recently been considered a potential replacement suit for the constant wear dry immersion suit currently used by Canadian Forces aircrew. The objective of the present evaluation trial was to evaluate the effectiveness of the new neck seal concept by measuring water leakage into the MAC 200 suit during a simulated parachute jump into water followed by a 15 s drag. Four male aircrew members volunteered to participate in the study. On Day 1 they jumped from the back of a boat (about 30 cm above the water) moving at a speed of 5 km . h-1 and were dragged for 15 sec. On Day 2, the aircrew jumped from a platform 3 m above water to simulate the speed of parachute entry and were immediately attached to a line and dragged behind a boat for 15 sec at a speed of 5 km/h. Before and after the jump/drag procedure the aircrew were weighed to estimate the amount of water leakage into the suit. The results showed that when the neck and wrist seals of the suit were closed properly before the entry into the water, no leakage was observed following the jump/drag procedure on both testing days.
DTIC
Parachutes; Protective Clothing; Water Immersion; Wettability

19980209728 Defence and Civil Inst. of Environmental Medicine, Downsview, Ontario Canada

Efficacy of Liquid, Air, and Phase Change Material Torso Cooling During Light Exercise While Wearing NBC Clothing

McLellan, Tom M., Defence and Civil Inst. of Environmental Medicine, Canada; Frim, John, Defence and Civil Inst. of Environmental Medicine, Canada; Mar. 1998; 36p; In English

Report No.(s): AD-A345833; DCIEM-98-R-36; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This study compared the thermoregulatory responses with liquid, air and phase change material (PCM) torso cooling during light exercise at 40 C while wearing NBC protective clothing. The liquid-(LC) and air-cooling (AC) systems were powered from external portable chiller units. The PCM cooling vests, which were supplied by Microclimate Systems Incorporated, were worn under the NBC overgarment and were tested with a vertical (CVV) and horizontal (CVH) design. Seven males (29 yrs, 75.6 kg, 1.78 m) performed a no cooling (NC) and 4 cooling trials while walking at 3.5 km.h-1 on a treadmill in the environmental chamber. During the NC condition, tolerance times were 100 min and final core temperature was 39.1 C. For the PCM trials (CVV and CVH), tolerance times were extended by 30 min but core temperature still rose to reach values close to 39.0 deg C indicating that the cooling vests could only delay the exhaustion from the heat exposure. However, with both the LC and AC trials, all subjects completed 180 min of exercise and they could of continued longer given that their core temperatures were still below 38.0 C. The results have shown that the PCM cooling vests are of benefit for work tasks that continue between 1 to 2 hours but these vests are not as effective in reducing the heat strain of wearing NBC clothing in hot environments as liquid- or air-cooling systems.

DTIC

Protective Clothing; Thermoregulation; Air Cooling; Physical Exercise; Physiological Responses

19980210008 NASA Johnson Space Center, Houston, TX USA

Understanding Skill in EVA Mass Handling, Volume 3, Empirical Developments and Conclusions

Riccio, Gary E., Nascent Technologies, USA; McDonald, P. Vernon, Nascent Technologies, USA; Jul. 1998; 46p; In English

Contract(s)/Grant(s): RTOP 199-16-11-48

Report No.(s): NASA/TP-1998-3684/Vol-3; NAS 1.60:3684/Vol-3; S-827; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Key attributes of skilled mass handling were identified through an examination of lessons learned by the extravehicular activity operational community. These qualities were translated into measurable quantities. The operational validity of the ground-based investigation was improved by building a device that increased the degrees of freedom of extravehicular mobility unit motion on the Precision Air-Bearing Floor. The results revealed subtle patterns of interaction between motions of an orbital replacement unit mockup and mass handler that should be important for effective performance on orbit. The investigation also demonstrated that such patterns can be measured with a variety of common instruments and under imperfect conditions of observation.

Author

Extravehicular Activity; Extravehicular Mobility Units; Mass; Human Behavior

19980210109 Oak Ridge National Lab., TN USA

Beta reduction factors for protective clothing at the Oak Ridge National Laboratory

Franklin, G. L., Oak Ridge National Lab., USA; Gonzalez, P. L., Oak Ridge National Lab., USA; [1998]; 9p; In English, 8-11 Feb. 1998, Mobile, AL, USA

Contract(s)/Grant(s): DE-AC05-96OR-22464

Report No.(s): ORNL/CP-95027; CONF-980203; DE98-000896; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

Beta reduction factors (fsub (beta)) for protective clothing (PC) at the Oak Ridge National Laboratory (ORNL) have been determined for a variety of protective clothing combinations. Data was collected to determine the experimental fsub (beta)) for several combinations of PCs under laboratory conditions. Radiation dose rates were measured with an open window Bicron(reg sign) RSO-5 ion chamber for two distinct beta energy groups (Esub max) = 1.218 (times) 10(sup (minus) 13) J(0.960 MeV) and 3.653 (times) 10(sup (minus) 13) J (2.280 MeV)). Data points determined, as the ratio of unattenuated (no PCs) to attenuated (PCs), were used to derive a set of equations using the Microsoft(reg sign) Excel Linet function. Field comparison tests were then conducted to determine the validity of these beta reduction factors. The fsub (beta)) from the field tests were significantly less than the experimental fsub (beta)), indicating that these factors will yield conservative results.

DOE

Ionization Chambers; Protective Clothing

19980210554 IPROZ Zagreb, Croatia

Work and Safety, March 1997 (Rad i Sigurnost) Chemical Abstracts, Health and Safety Science Abstracts

Dec. 1997; 134p; In English; In Croatian

Report No.(s): PB98-141633; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)); Abstracts, Microfiche

The paper presents the results of a sample survey of comprehensibility and recognizability of safety signs. Two groups of examinees were randomly chosen for the examinations. There were secondary school students aged 15-18 in the first group, and in the second group persons at the age of 40-50, with a greater life and work experience. The research has shown that the examinees recognized the majority of signs and their messages. In the group of warning signs a considerable number of messages made according to ISO standards and EEC guidelines were not recognized.

NTIS

Safety; Health; Surveys

19980210638 Nanomaterials Research Corp., Tucson, AZ USA

Intermediate-temperature electrolysis cells for oxygen production from carbon dioxide

Hu, H., Nanomaterials Research Corp., USA; Yadav, T., Nanomaterials Research Corp., USA; In Situ Resource Utilization (ISRU II) Technical Interchange Meeting; 1997, pp. 15; In English; Also announced as 19980210630; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

In this project, Nanomaterials Research Corporation has sought to develop intermediate-temperature electrolysis cells based on YSZ electrolyte. The work has been focused on nano-engineering of the electrolyte-electrode interfaces in order to minimize interfacial overpotentials and total cell resistance at intermediate temperatures. A series of mixed ionic-electronic conducting (MIEC) metal-ceramic nano-composites have been studied as electrode materials for YSZ-based electrolysis cells. Impedance spectroscopy and dc measurement have been used for identifying highly catalytically active MIEC nano-composite electrode materials under oxygen pump conditions.

Derived from text

Electrolytic Cells; Liquid-Solid Interfaces; Interface Stability; Oxygen Production; Cermets; Nanostructures (Devices); Electrode Materials

19980210641 Ceramphysics, Inc., Westerville, OH USA

Oxygen extraction using a ceramic honeycomb technology

Lawless, W. N., Ceramphysics, Inc., USA; In Situ Resource Utilization (ISRU II) Technical Interchange Meeting; 1997, pp. 23; In English; Also announced as 19980210630; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

The results of a NASA-supported study are reported to examine if a ceramic-honeycomb technology can contribute to producing oxygen from the Martian atmosphere. The honeycomb technology is based on a stabilized Bi2O3 ceramic composition and has been developed for extracting oxygen from air in the 500-600 C range.

Derived from text

Ceramic Honeycombs; Honeycomb Structures; Extraction; Oxygen Production; Mars Atmosphere; Extraterrestrial Resources

19980210642 NASA Kennedy Space Center, Cocoa Beach, FL USA

Oxygen liquefaction and zero-loss storage system

Lin, F. N., NASA Kennedy Space Center, USA; Bollo, T. R., NASA Kennedy Space Center, USA; Peterson, D. M., NASA Kennedy Space Center, USA; In Situ Resource Utilization (ISRU II) Technical Interchange Meeting; 1997, pp. 25-26; In English; Also announced as 19980210630; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

This paper presents an alternative concept that employs existing technologies and off-the-shelf components to liquefy gaseous oxygen from an in-situ propellant production (ISPP) unit and to store the liquid oxygen without boil-off loss. A primary goal is to minimize active components with a secondary goal of designing the active component in a protected or failure-free environment. The resulting design requires only one active component, a compressor operating in a closed and consequently more protected system. The design avoids pumps as active components by employing cryopumping for gaseous oxygen (GOX) and gravity transfer for liquid oxygen (LOX).

Derived from text

Oxygen; Liquid Oxygen; Oxygen Production; Liquefaction; Propellant Storage; Liquid Rocket Propellants

19980210646 Old Dominion Univ., Norfolk, VA USA

Oxygen production and separation from Martian atmosphere by the radio-frequency discharge

Vuskovic, L., Old Dominion Univ., USA; Ash, R. L., Old Dominion Univ., USA; Popovic, S., Old Dominion Univ., USA; Dinh, T., Old Dominion Univ., USA; VanOrden, A., Old Dominion Univ., USA; In Situ Resource Utilization (ISRU II) Technical Interchange Meeting; 1997, pp. 33; In English; Also announced as 19980210630; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Included are the new results from the experiments on the radio-frequency discharge of Martian atmospheric gas and separation of oxygen from the gas mixture using a silver membrane. The discharge was generated at simulated conditions of the Martian surface atmosphere. Background gas pressure was 6 to 7 Torr. Gas mixture contained 95.7% CO2, 2.7% N2, and 1.6% Ar. Derived from text

Radio Frequency Discharge; Oxygen Production; Mars Atmosphere; Silver

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